

We Claim:

1. A method for configuring a reconfigurable system, wherein the reconfigurable system comprises a programmable hardware element and one or more fixed hardware resources coupled to the programmable hardware element, the method comprising:

5 displaying a graphical user interface on a display which is useable for configuring the reconfigurable system, wherein the graphical user interface displays fixed hardware resource icons corresponding to each of at least a subset of the one or more fixed hardware resources;

10 receiving user input to the graphical user interface specifying a function;

generating a hardware configuration program based on the user input, wherein the hardware configuration program is deployable on the reconfigurable system; and

15 deploying the hardware configuration program on the programmable hardware element, wherein the hardware configuration program specifies use of one or more of the fixed hardware resources;

wherein, after said deploying, the reconfigurable system is operable to perform the function.

20 2. The method of claim 1, further comprising:

modifying an appearance of respective fixed hardware resource icons as the corresponding fixed hardware resources are allocated to perform functions in response to the user input, wherein the modified appearance of the respective fixed hardware resource icons visually indicates to the user that the corresponding fixed hardware resources have been allocated for use.

25 3. The method of claim 1, further comprising:

displaying an icon corresponding to the programmable hardware element; and

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interactively displaying proposed configurations of the programmable hardware element in response to said receiving user input.

4. The method of claim 1, wherein the reconfigurable system is a
5 reconfigurable measurement system, wherein the function is a measurement function.

5. The method of claim 1, wherein the reconfigurable system is one or more of a reconfigurable control system, a reconfigurable automation system, and a reconfigurable simulation system; and

10 wherein the function is a corresponding one or more of a control function, an automation function, and a simulation function, respectively.

6. The method of claim 1,

wherein said receiving user input comprises:

15 receiving user input regarding one or more of the fixed hardware resources required by an application to perform the function; and

receiving user input specifying timing and triggering requirements of the application with respect to the specified fixed hardware resources.

20 7. The method of claim 1, wherein said generating a hardware configuration program comprises:

generating a description file which identifies resources and features to perform the function indicated by the user;

generating a program from the description file;

25 generating hardware description language (HDL) code from the program; and

generating the hardware configuration program from the HDL code;

wherein the hardware configuration program is usable to configure a programmable hardware element comprised in the reconfigurable system to perform the function.

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8. The method of claim 7, wherein the program is a graphical program.
 9. The method of claim 1, wherein the programmable hardware element is a field programmable gate array (FPGA), and wherein the hardware configuration program comprises a program binary file for the FPGA.
 10. The method of claim 1, further comprising:
 - executing the hardware configuration program on the programmable hardware element to perform the function;
 - wherein said executing comprises:
 - the programmable hardware element executing a first portion of the function; and
 - the programmable hardware element invoking operation of one or more of the fixed hardware resources to perform a second portion of the function.
 11. A method for configuring a reconfigurable measurement system, wherein the reconfigurable measurement system comprises a programmable hardware element and one or more fixed hardware resources coupled to the programmable hardware element, the method comprising:
 - displaying a graphical user interface on a display which is useable for configuring the reconfigurable measurement system, wherein the graphical user interface displays icons corresponding to each of at least a subset of the fixed hardware resources;
 - receiving user input specifying a measurement function;
 - generating a hardware configuration program, wherein the hardware configuration program is deployable on the reconfigurable measurement system; and
 - deploying the hardware configuration program on the programmable hardware element, wherein the hardware configuration program specifies use of one or more of the fixed hardware resources;

wherein, after said deploying, the reconfigurable measurement system is operable to perform the measurement function.

12. The method of claim 11, wherein said receiving user input comprises:
5 receiving user input regarding one or more of the fixed hardware resources required by an application to perform the function; and
receiving user input specifying timing and triggering requirements of the application with respect to the fixed hardware resources.

10 13. A method for configuring a reconfigurable system, comprising:
receiving user input specifying resources required by an application to perform a function;
receiving user input specifying timing and triggering requirements of the application with respect to the specified resources; and
15 generating a hardware configuration program, wherein the hardware configuration program is deployable on the reconfigurable system, wherein, after said deployment, the reconfigurable system is operable to perform the function.

14. The method of claim 13, wherein said specifying resources comprises:
20 selecting one or more of hardware and software resources; and
indicating configuration settings for the selected resources.

15. The method of claim 13, wherein said generating a hardware configuration program comprises:
25 generating a description file which identifies resources and features indicated by the user;
generating a program from the description file;
generating hardware description language (HDL) code from the program; and
generating the hardware configuration program from the HDL code;

wherein the hardware configuration program is usable to configure a programmable hardware element comprised in the reconfigurable system to perform the function.

5 16. The method of claim 15, wherein the program is a graphical program.

17. The method of claim 15, wherein the programmable hardware element is a field programmable gate array (FPGA), and wherein the hardware configuration program comprises a program binary file for the FPGA.

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18. The method of claim 13, further comprising:
executing the hardware configuration program on the programmable hardware element to perform the function;
wherein said executing comprises:

15 the programmable hardware element executing a first portion of the function; and

the programmable hardware element invoking operation of one or more of the fixed hardware resources to perform a second portion of the function.

20 19. The method of claim 13, wherein said receiving user input specifying resources and said receiving user input specifying timing and triggering requirements are performed by a server computer system, the method further comprising:

a user computer system accessing the server computer system over a network prior to said receiving user input specifying resources.

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20. The method of claim 13, wherein said receiving user input specifying a function is performed by a server computer system, the method further comprising:

a user computer system accessing the server computer system over a network prior to said receiving user input.

21. A system for configuring a reconfigurable device, comprising:
a computer system comprising a processor and a memory;
5 wherein the memory stores a graphical user interface program which is executable to receive user input specifying a function;
wherein the memory also stores a configuration generation program which is executable to generate a hardware configuration program based on the user input; and
a device coupled to the computer system, wherein the device includes:
10 a programmable hardware element, wherein the hardware configuration program is operable to be deployed onto the programmable hardware element; and
one or more fixed hardware resources coupled to the programmable hardware element;
wherein the graphical user interface program is further executable to display icons
15 on a display corresponding to each of at least a subset of the fixed hardware resources;
wherein the hardware configuration program specifies a configuration for the programmable hardware element that implements the function;
wherein the hardware configuration program further specifies usage of the one or
more fixed hardware resources by the programmable hardware element in performing the
20 function; and
wherein, after the hardware configuration program is deployed onto the programmable hardware element, the device is operable to perform the function.

22. The system of claim 21, wherein the graphical user interface program is
25 further executable to modify an appearance of respective fixed hardware resource icons as the corresponding fixed hardware resources are allocated to perform functions in response to the user input, wherein the modified appearance of the respective fixed hardware resource icons visually indicates to the user that the corresponding fixed hardware resources have been allocated for use.

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23. The system of claim 21, wherein the graphical user interface program is further executable to:

- 5 display an icon corresponding to the programmable hardware element; and
interactively display proposed configurations of the programmable hardware element in response to said receiving user input.

24. The system of claim 21, wherein the reconfigurable device is a reconfigurable measurement device, wherein the function is a measurement function.

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25. The system of claim 21, wherein the reconfigurable device is one or more of a reconfigurable control device, a reconfigurable automation device, and a reconfigurable simulation device; and

15 wherein the function is a corresponding one or more of a control function, an automation function, and a simulation function, respectively.

26. The system of claim 21, wherein, in being executable to receive user input, the graphical user interface program is executable to:

20 receive user input regarding one or more of the fixed hardware resources required by an application to perform the function; and
receive user input specifying timing and triggering requirements of the application with respect to the specified fixed hardware resources.

27. The system of claim 21, wherein, in being executable to generate a hardware configuration program, the configuration generation program is executable to:

25 generate a description file which identifies resources and features to perform the function indicated by the user;
generate a program from the description file;
generate hardware description language (HDL) code from the program; and

generate the hardware configuration program from the HDL code; wherein the hardware configuration program is usable to configure the programmable hardware element comprised in the reconfigurable device to perform the function.

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28. The system of claim 27, wherein the program is a graphical program.
29. The system of claim 21, wherein the programmable hardware element is a field programmable gate array (FPGA), and wherein the hardware configuration program comprises a program binary file for the FPGA.

10 30. The system of claim 21, wherein the device performing the function comprises the programmable hardware element executing the hardware configuration program to perform the function; and

- 15 wherein said executing comprises:
the programmable hardware element directly performing a first portion of the function; and
the programmable hardware element invoking operation of one or more of the fixed hardware resources to perform a second portion of the function.

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31. A system for configuring a reconfigurable measurement device, comprising:

- 25 a computer system comprising a processor and a memory;
wherein the memory stores a graphical user interface program which is executable to receive user input specifying a measurement function;
wherein the memory also stores a configuration generation program which is executable to generate a hardware configuration program based on the user input; and
a device coupled to the computer system, wherein the device includes:

a programmable hardware element, wherein the hardware configuration program is operable to be deployed onto the programmable hardware element; and

one or more fixed hardware resources coupled to the programmable hardware element;

5 wherein the graphical user interface program is further executable to display icons on a display of the computer system corresponding to each of at least a subset of the fixed hardware resources;

 wherein the hardware configuration program specifies a configuration for the programmable hardware element that implements the measurement function;

10 wherein the hardware configuration program further specifies usage of the one or more fixed hardware resources by the programmable hardware element in performing the measurement function; and

15 wherein, after the hardware configuration program is deployed onto the programmable hardware element, the measurement device is operable to perform the measurement function.

32. The system of claim 31, further comprising:

 a deployment program executable to deploy the hardware configuration program onto the programmable hardware element, wherein, after said deployment, the programmable hardware element is operable to perform the measurement function in conjunction with the one or more fixed hardware resources.

33. A system for configuring a reconfigurable device, comprising:

 a computer system comprising a processor and a memory, wherein the memory stores a graphical user interface program which is executable to:

 receive user input specifying resources required by an application to perform a function; and

 receive user input specifying timing and triggering requirements of the application with respect to the specified resources;

wherein the memory also stores a configuration generation program which is executable to:

generate a hardware configuration program, wherein the hardware configuration program is deployable on the reconfigurable system, and wherein, after said deployment, the reconfigurable device is operable to perform the function; and

a reconfigurable device coupled to the computer system, wherein the device includes:

a programmable hardware element, wherein the hardware configuration program is operable to be deployed onto the programmable hardware element; and

10 one or more resources coupled to the programmable hardware element;

wherein the graphical user interface program is further executable to display icons on a display of the computer system corresponding to each of at least a subset of the resources;

15 wherein the hardware configuration program specifies a configuration for the programmable hardware element that implements the function;

wherein the hardware configuration program further specifies usage of the one or more resources by the programmable hardware element in performing the function; and

wherein, after the hardware configuration program is deployed onto the programmable hardware element, the device is operable to perform the function.

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34. The system of claim 33, wherein said specifying resources comprises:

selecting one or more of hardware and software resources; and

indicating configuration settings for the selected resources.

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35. The system of claim 33, in being executable to generate a hardware configuration program, the configuration generation program is executable to:

generate a description file which identifies resources and features indicated by the user;

generate a program from the description file;

- 5 41. A memory medium comprised on a computer system, comprising:
a graphical user interface program which is executable to receive user input
specifying a function;
a configuration generation program which is executable to generate a hardware
configuration program based on the user input;
10 wherein said hardware configuration program is usable to configure a device
coupled to the computer system, wherein the device includes:
a programmable hardware element, wherein the hardware configuration
program is operable to be deployed onto the programmable hardware element; and
one or more fixed hardware resources coupled to the programmable
15 hardware element;
wherein the graphical user interface program is further executable to display icons
on a display corresponding to each of at least a subset of the fixed hardware resources;
wherein the hardware configuration program specifies a configuration for the
programmable hardware element that implements the function;
20 wherein the hardware configuration program further specifies usage of the one or
more fixed hardware resources by the programmable hardware element in performing the
function; and
wherein, after the hardware configuration program is deployed onto the
programmable hardware element, the device is operable to perform the function.

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42. The memory medium of claim 41, wherein the graphical user interface
program is further executable to modify an appearance of respective fixed hardware
resource icons as the corresponding fixed hardware resources are allocated to perform
functions in response to the user input, wherein the modified appearance of the respective

fixed hardware resource icons visually indicates to the user that the corresponding fixed hardware resources have been allocated for use.

43. The memory medium of claim 41, wherein the graphical user interface
5 program is further executable to:

display an icon corresponding to the programmable hardware element; and
interactively display proposed configurations of the programmable hardware
element in response to said receiving user input.

10 44. The memory medium of claim 41, wherein the reconfigurable device is a
reconfigurable measurement device, wherein the function is a measurement function.

15 45. The memory medium of claim 41, wherein the reconfigurable device is
one or more of a reconfigurable control device, a reconfigurable automation device, and a
reconfigurable simulation device; and

wherein the function is a corresponding one or more of a control function, an
automation function, and a simulation function, respectively.

20 46. The memory medium of claim 41, wherein, in being executable to receive
user input, the graphical user interface program is executable to:

receive user input regarding one or more of the fixed hardware resources required
by an application to perform the function; and

receive user input specifying timing and triggering requirements of the application
with respect to the specified fixed hardware resources.

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47. The memory medium of claim 41, wherein, in being executable to
generate a hardware configuration program, the configuration generation program is
executable to:

generate a description file which identifies resources and features to perform the function indicated by the user;

generate a program from the description file;

generate hardware description language (HDL) code from the program; and

5 generate the hardware configuration program from the HDL code;

wherein the hardware configuration program is usable to configure the programmable hardware element comprised in the reconfigurable device to perform the function in conjunction with the one or more fixed hardware resources.

10 48. The memory medium of claim 47, wherein the program is a graphical program.

49. The memory medium of claim 47, further comprising:

15 a deployment program executable to deploy the hardware configuration program onto the programmable hardware element, wherein, after said deployment, the programmable hardware element is operable to perform the function in conjunction with the one or more fixed hardware resources.

20 50. The memory medium of claim 41, wherein the programmable hardware element is a field programmable gate array (FPGA), and wherein the hardware configuration program comprises a program binary file for the FPGA.